



U.S. Department
of Transportation

**Federal Aviation
Administration**

Memorandum

Subject: Action: Review and Concurrence, Equivalent Level of
Safety Finding for Usage of New Materials on a Model
747-400 (910K)

Date: July 12, 2002

FAA Project Number TD5409SE-T

Reg Ref: §25.613

From: Manager, TSS Airframe Branch, ANM-115

Reply to: Tammy Anderson
Attn of: Airframe, ANM-120S

To: Manager, Seattle Aircraft Certification Office, ANM-100S

ELOS: TD5409SE-T-A-1
Memo #:

Background

The project incorporates design changes to the production 747-400 to allow for a higher maximum takeoff gross weight of 910,000 lb [maximum taxi weight (MTW) of 913K] and additional fuel capacity. The 747-400 airplane uses “S” basis materials (i.e., statistically-based design values have not been established) common to the auxiliary body fuel tank support structure and the variable camber flaps. Federal Aviation Regulation (FAR) 25.613 at amendment 46 requires that material strength properties be based on a sufficient number of tests to establish a statistical basis for the design values. For single load path structure, FAR 25.613 further requires the design values must be established with a 99 % probability and 95 % confidence. For multiple load path structure, the design values must be established with a 90 % probability and a 95 % confidence.

Applicable regulation(s)

§§ 25.603, 25.613

Regulation(s) requiring an ELOS

§ 25.613

Description of compensating design features or alternative standards which allow the granting of the ELOS (including design changes, limitations or equipment need for equivalency)

Boeing traditionally has used materials which do not have design values based on sufficient testing to establish the values with the required probability and confidence. Many of these materials have been extensively tested, but statistically based design values have not been established. In other cases, the materials have been used in service for many years with no adverse service history. Furthermore, Boeing has procurement and quality control procedures in place that ensure that the materials received conform to the specification design values.

Explanation of how design features or alternative standards provide an equivalent level of safety to the level of safety intended by the regulation

The static design allowables for new structural materials and existing structural materials in new applications on the 747-400 (913K) will be substantiated in document D6U10415, entitled New Material Allowable Design Properties—747-400 (913K). A description of each material's usage, design allowable, and references for that allowable will be included in this document. This information will supplement data already collected and approved in other documents. Data that supports the following criteria will be included in document D6U10415, which demonstrate that materials used on the 747-400 (913K) comply with FAR 25.613 and allow for an equivalent safety finding:

- General description of new materials and/or materials used previously in the Boeing fleet but in new applications on the 747-400 (913K) airplane.
- Document references and discussion regarding minimum allowable design properties.
- Procurement specifications.
- Data is available to support the material specification used (BMS, AMS, MIL & QQ-A).
- The supplier quality system ensures statistical process control and specification conformance, including meeting the strength and other properties defined in the specification.
- Materials are procured from suppliers which have demonstrated the ability to produce the material by meeting all of the specification requirements.
- Boeing Quality Assurance oversees all materials received.

FAA approval and documentation of the ELOS

The FAA has approved the aforementioned Equivalent Level of Safety Finding in issue paper A-1. This memorandum provides standardized documentation of the ELOS that is non-proprietary and can be made available to the public. The Transport Directorate has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrieval of this ELOS. This ELOS Memorandum number should be listed in the Type Certificate Data Sheet under the Certification Basis section (TC's & ATC's) or on page 3 of the STC Certificate.

[E.g. Equivalent Safety Findings have been made for the following regulation(s):

§25.613 Material Strength Properties and Design Values (documented in TAD ELOS Memo TD5409SE-T-A-1)]

/Original Signed by Greg Schneider/
Manager, Airframe and Cabin Safety Branch, ANM-115

7/12/02
Date

ELOS Originated by Seattle ACO:	Name Walter Sippel	Routing Symbol ANM-120S
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ANM-120S:WSIPPEL:X2774:

File: 8110-5/747

PROJECT NO.: TD5409SE-T

WORK MEASURE:

INCOMING: N/A

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